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In this issue

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I am pleased to introduce the fourth issue of the *Journal of Radiotherapy in Practice* for Volume 19, published in December 2020. To open this issue, Mason, Bennett, White and Rembielakl present an editorial on the changing radiotherapy review practice in response to COVID-19 in a radiotherapy satellite centre. To follow there are six original articles, three literature reviews, a technical note, a case study and two Letters to the Editor.

In the first paper, the authors Thuruthiyil, Cawley and Metwaly investigate fiducial marker (FM) migration and calculate the prostate planning target volume (PTV) margin considering the setup errors after translation corrections alone (T) and translation plus rotational corrections (T + R) and anatomy variation with respect to the corrected FM position, analysed on cone-beam computed tomography (CBCT) images.

CBCT images from 25 patients are analysed for FM movements, setup error and anatomy variation with respect to the seed match positions. Systematic and random components of setup error and prostate movements are used to calculate the PTV margin for CBCT-based FM localisation in two scenarios, translation corrections only and translation plus rotational correction. MTNW887825 soft tissue gold markers (Civco) were utilised with the department-specific immobilisation system and rectal and bladder-filling protocols.

The findings of the study indicate minimal FM movement. The PTV margin to incorporate the daily T + R corrected setup error and prostate deformation is found to be 2·5 mm, 4·5 mm and 5·2 mm in RL, AP and SI directions, respectively. Corresponding margins for T only corrected scenario are found to be 2·8 mm, 4·8 mm and 5·7 mm.

In the next paper, Baker, Buckley, Misra and Bridge study the use of Papillon contact X-ray brachytherapy (CXB), used as an alternative to surgery for rectal cancer and undertake an audit of patients, who were referred for and treated with CXB over a 6-year period, against guidelines derived from a critical review of the evidence base

Patient demographics, tumour characteristics and outcome data were gathered for 31 patients referred for CXB. A critical review of the evidence identified consensus referral criteria and outcome data against which to audit patients.

This audit confirmed the validity of referral and treatment protocols and should guide future referrals until evidence from ongoing studies becomes available. These findings should contribute to the development of robust national guidelines.

In the next paper Henni, Lauzin, Pirault, Dubos, Roge, Clarisse, Gensanne and Thureau outline the superior dosimetric impact of volumetric-modulated arc therapy (VMAT) in lung cancer compared with three-dimensional conformal radiotherapy (3DCRT). However, this improvement is often associated with an increase in low doses. The aim of this study is to quantify these results more accurately

For each of 36 patients treated between 2015 and 2017 with 3DCRT, a second VMAT treatment plan was calculated. Usual dosimetric parameters such as target coverage or dose to the organs at risk were used to achieve the comparisons.

The study concludes that all the dosimetric parameters were improved with VMAT compared to the 3DCRT without increasing low doses when using partial arcs.

In the next study, Menoux, Antoni, Santelmo, Truntzer, Schumacher, Labani and Noël explore the radiographic findings after stereotactic body radiation therapy for stage I non-small cell-lung carcinomas in a retrospective analysis of 90 patients. Stereotactic body radiation therapy for lung tumours can expose to radiation pneumonitis (less than 6 months after irradiation) and lung fibrosis (beyond 6 months). This retrospective study of 90 patients with a stage I non-small-cell lung carcinoma reports a detailed description of the scenographic changes that can be observed, according to the modified Kimura score for radiation pneumonitis and Koenig's classification for fibrosis.

The authors conclude that the radiological parenchymal changes are frequent, which renders the tumour response monitoring by tumour size, particularly by RECIST, unsuitable.

In the next paper, Montgomery, Flood and Shepherd undertake a service evaluation of the immobilisation techniques adopted for breast cancer patients with large and/or pendulous breasts, receiving external beam radiotherapy. Breast cancer patients referred for external beam radiotherapy and who have large and/or pendulous breasts can present positioning and immobilisation challenges. Deep infra-mammary and/or lateral wrap skin folds can occur that can lead to unwanted radiation-induced skin toxicity. The purpose of the study was to evaluate the immobilisation techniques adopted for this subgroup of patients in order to inform best practice.

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A survey aimed to identify the current clinical practice in radiotherapy centres throughout the United Kingdom (UK) and Ireland was undertaken. The email survey was distributed with the support of the Radiotherapy Services Managers group.

The findings are that immobilisation and reproducibility are key for successful external beam radiotherapy particularly when advanced treatment techniques are being employed. No single technique gained widespread acceptance as the optimum for the effective immobilisation of patients with large and/or pendulous breasts. Further evaluative research in the form of a multi-centre trial is warranted in order to clearly establish the most effective immobilisation methods/devices for this ever-expanding, subgroup of cancer patients.

In the study by Ferguson, Ahmad and Ali, the purpose is to investigate the feasibility of proton arc therapy (PAT) using the double-scattering MEVION-S250-proton system. The treatment planning and dose delivery parameters from PAT were compared with conventional treatment planning techniques.

Proton arc therapy was simulated with multiple conformal and fixed-aperture beams (5–15) using the MEVION-S250-double-scattering proton system. Conformal apertures were simulated with the Eclipse-treatment-planning system: (a) using a static single aperture that provides the best average conformal circular or rectangular apertures to cover the tumour from different angular views (SPAT) and (b) dynamic conformal apertures of the tumour shape at each irradiation angle that can be obtained from a multi-leaf-collimator system (DPAT).

The authors conclude that PAT plans have superior dose coverage and sparing of normal tissues compared to CPT plans using the MEVION double scattering system as shown in this simulation study. Ideally, conformal proton arcs require beam shaping and dose delivery with the gantry moving, however, the MEVION double-scattering system lacks an MLC system and cannot deliver dose during gantry rotation. The single aperture conformal proton therapy technique is more time and cost-effective compared with conventional techniques that are used currently with the MEVION proton therapy system because of the elimination of the need for patient-specific compensators. In the present study, PAT was simulated with the MEVION double-scattering proton therapy system; however, it can be performed also with other proton therapy systems.

In the paper by Tudu, Kumar, Singh and Raina authors study the acute toxicity profile of three-dimensional conformal concurrent chemoradiation in carcinoma cervix. Concurrent chemoradiation is the definitive treatment for advanced cervical cancer. Pelvic radiation is known to damage the adjacent normal tissues thereby causing acute toxicities. The modern conformal radiation techniques like 3DCRT and IMRT are known to reduce the toxicities and improve clinical outcomes. The study retrospectively evaluates the frequency and severity of acute toxicities encountered during concurrent chemoradiation of locally advanced cancer cervix treated with 3DCRT

The medical case records of 174 cervical cancer patients treated from November 2015 to November 2018 were studied. One hundred and thirteen histologically proven locally advanced cancer cervix patients (stage IIB–IIIB) treated with concurrent 3D conformal chemoradiation between were included in the study. Patients received 46 Gy in 23 fractions with concurrent weekly cisplatin (40 mg/m^2) on day 1, 8, 15 and 22 of radiation. The study endpoints were treatment-related toxicities, which were graded according to CTCAE version 5.0.

The authors conclude that concurrent chemoradiation is the definitive treatment for locally advanced carcinoma cervix with acceptable toxicities. Proper management measures should be undertaken for these toxicities to avoid treatment interruptions and ensure better treatment compliance.

In the paper by Palwe, Patil, Pandit and Nagarka, the authors research the factors influencing non-adherence to radiotherapy in a retrospective audit of 1,548 patients. The study aimed to determine the frequency, factors, and reasons for patient non-adherence to radiotherapy in a tertiary cancer centre. Inadvertent treatment interruptions often lead to prolongation of planned treatment time. In the case of radiotherapy with a curative intent, prolongation of planned treatment has been associated with inferior clinical outcomes. Delay or prolongation of treatment is associated with a relative risk of local recurrence by up to 2% per day for specific malignancies. Thus, it is critical to understand the key factors that influence non-adherence to radiotherapy.

This study reveals several factors that contribute to non-adherence to treatment and indicates that treatment adherence is a major factor in determining successful outcomes amongst cancer patients treated with radiotherapy.

In the first of three literature reviews, McAlinden, Mullan and Shepherd undertake an evaluation of the skincare management of patients receiving radiotherapy for breast cancer. Breast cancer patients experience skin reactions during radiotherapy. Radiation-induced skin reactions can result in treatment delivery being interrupted. The aim of this paper is to evaluate the skincare management of patients receiving radiotherapy for breast cancer in order to inform best practice

A literature search was undertaken using USearch and HONNI in support of the first-hand evidence gained from the supervised on-treatment review of patients receiving radiotherapy for breast cancer.

There is evidence to suggest that the skincare advice given to patients varies widely between departments in the UK with many not following nationally recommended guidelines. Studies demonstrate that there are ways to reduce skin reactions and that there are a range of effective management strategies being adopted. Prophylactic skincare has been explored to improve the resilience of the skin prior to commencing radiotherapy. Further investigation is required in order to clearly establish the optimum national skincare management for breast cancer patients. More studies are required to test the effectiveness and viability of prophylactic measures. Skincare guidance needs to be robustly developed and effectively promoted by therapeutic radiographers for radiotherapy patients to benefit from reduced, radiation-induced, skin reactions.

In the next review of the literature, Osei, Lumini, Gunasekara, Osei, Asare and Laflamme undertake a review of the predictive, prognostic and diagnostic biomarkers for non-small-cell lung cancer: towards personalised and targeted cancer therapy. Lung cancer has a high mortality rate mainly due to the lack of early detection or outward signs and symptoms, thereby often progressing to advanced stages (e.g., stage IV) before it is diagnosed. However, if lung cancers can be diagnosed at an early stage and also if clinicians can prospectively identify patients likely to respond to specific treatments, then there is a very high potential to increase patients' survival. In recent years, there have been several investigations to identify cancer biomarkers for lung cancer risk assessment, early detection and diagnosis, the likelihood of identifying which group of patients will benefit from a particular treatment and monitoring patient response to treatment.

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This paper reports on the review of 19 current clinical and emerging biomarkers used in risk assessment, screening for early detection and diagnosis, and monitoring the response of treatment of non-small-cell lung cancers.

The review concludes that the future holds promise for personalised and targeted medicine from prevention, diagnosis to treatment that takes individual patient's variability into account, although it will depend on the development of effective biomarkers interrogating key aberrant pathways and potentially targetable with molecular targeted or immunologic therapies.

The aim of the review by Drabble and Drury-Smith is to evaluate the quality of rectal hydrogel spacer (HS) insertions from literature in patients undergoing radical radiotherapy for prostate cancer. The secondary aim is to assess the benefit of HS's in patients risk factors more likely to have rectal complications, such as; non-conventional radiotherapy dose fractionations and high-risk disease.

A literature search of peer-reviewed electronic articles was carried out using Boolean connectors and Medical Subject Headings (MeSH) in the databases. Databases searched included Science Direct, Medline and Cinalh. The articles were assessed using relevant CASP tools.

The findings are that a spacer scoring system based on the HS symmetry has provided evidence of the quality of the position inserted, which was visually aided by T2-weighted MRIs. Despite optimal HS placements ranging from 62 to 72%, HS had a clinically significant reduction of $\geq$25% in planned rectal V_{70} dose in 97% of patients.

In the technical note, Raina, Singh, Tudu, Singh and Kumar present their study to compare VMAT with dynamic intensity-modulated radiation therapy (dIMRT) and step-and-shoot-intensity-modulated radiation therapy (ssIMRT) for different treatment sites.

Twelve patients were selected for the planning comparison study. This included three head and neck, three brain, three rectal and three cervical cancer patients. A total dose of 50 Gy was given for all the plans. Plans were prepared for Elekta Synergy with the Monaco treatment planning system. All plans were generated with 6 MV photons beam. Plan evaluation was based on the ability to meet the dose–volume histogram, dose homogeneity index, conformity index, radiation delivery time and monitor unit needs to deliver the prescribed dose.

The results indicate that dIMRT and VMAT provide better sparing of normal tissue, homogeneity and conformity than ssIMRT with reduced treatment delivery time.

The case study presented in this issue is on the subject of radiotherapy treatment planning for prostate and nodes using a variable planning ring and is presented by Yadav, Yan and Paliwal.

To complete this issue, there are two Letters to the Editor; the first is a response by Ghaffari, Ardekani and Refahi to the literature review presented in this issue on 'What is the quality of hydrogel spacer insertions? And which patients will benefit?' by Drabble and Drury-Smith.

The second Letter to the Editor is presented by Kumar, Singh, Munda, Raina and Tudu and is entitled 'The new normal in oncology department in COVID-19 scenario'.

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